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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,898	04/14/2006	Kohei Shimoda	050395-0369	4687
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EXAMINER				
SHEVIN, MARK L				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/575,898

**Applicant(s)**

SHIMODA ET AL.

**Examiner**

Mark L. Shevin

**Art Unit**

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 6-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 6-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CD/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Status of Claims*

1. Claims 1, 6-12, filed as a preliminary amendment on April 14<sup>th</sup> 2006, are currently under examination.

### *Status of Previous Rejections*

2. The previous rejections of claims 1, 6, and 9-12 under 35 U.S.C. 103(a) over **Schmidt** (US 5,590,387) in view of **Yokoyama** (US 6,190,578) have been withdrawn in view a further search performed in this case.

### *Claim Rejections - 35 USC § 103*

3. **Claims 1, 6, and 9-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Schmidt** (US 5,590,387) in view of **Moritz** (T. Moritz and A. Nagy. Preparation of super soft granulate from nanosized ceramic powders by spray freezing. *Journal of Nanoparticle Research*, Vol. 4, (2002), p. 439-448.) and **Sommer** (K. Sommer. "Size Enlargement". In *Ullmann's Encyclopedia of Industrial Chemistry*. June 15, 2000, p. 1-15 and 37-40).

### Schmidt

Schmidt, teaches that there is a need to develop methods with which the agglomeration of nanoparticles can be controlled and such powders agglomerated in a regular manner can be obtained (col. 1, lines 40-50). Schmidt's invention forms nanoparticles and then removes the dispersion medium before a later end use, in particular, sintering (col. 3, lines 30-45). To allow agglomerates of metal or ceramics to deagglomerate in the desired dispersion medium to their primary particles and produce

a stable nanodisperse solution, organic surface modifier compounds are used (col. 5, lines 30-43). Schmidt's invention uses nano or microdisperse metal or ceramic powders of B, Al, Si, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, La, Y, Fe, Co, or Ni (col. 5, lines 1-6).

After completion of surface modification, the dispersion may have its dispersion medium entirely or partly removed before further processing using a method such as freeze drying or freeze spray drying (col. 7, lines 3-10).

The dry (granulated) surface-modified metal or ceramic powder may be redispersed in a different dispersion medium such as water or an organic solvent (col. 7, lines 10-17).

The metal or ceramic suspensions of the dry, surface modified nanocrystalline metal or ceramic powders have a particle size distribution of below 100 nm (col. 7, lines 18-21).

Thus Schmidt teaches the granulation of nanoscale (1-100 nm) metal powders by controlled agglomeration using a surface modifying organic compound. Furthermore Schmidt follows the general process steps of instant claim 1 including the cancelled matter in forming a suspension of nanoparticles and an organic compound capable of being absorbed on the surface of the nanoparticles (organic surface modifier), removing most of the medium by drying (such as freeze drying or spray drying as taught by Schmidt).

Schmidt, however, does not teach the apparent density of the granulated metal powder nor the water content.

Moritz

Moritz, drawn to the granulation of nanosize powders, teaches that nanoparticles such as ceramic particles possess poor flowability, very low bulk density, and tend to fly off as dust (p. 439, col. 2, para 3) which necessitates granulation to increase particle size, which improves transport, storage, and processing (p. 440, col. 1, para 1). Good granulates should be strong enough to withstand transport yet weak enough to be easily redispersed (p. 440, col. 1, para 2).

Moritz tested titania (titanium oxide –  $\text{TiO}_2$ ) powders with an initial particle size of 12-21 nm and a bulk density of 0.04 - 0.09 g/cm<sup>3</sup> (p. 441, col. 1, Table 1). Granulation increased the bulk density with the bulk density regulated by the drying rate (p. 447, col. 1, para 1).

Variables shown to affect the strength of the granules and their dispersibility were:

- presence of organic additive (Figure 11): acts as a temporary binder
- the granule diameter: shown to be a result effective variable for granules forms by other methods as well (Figure 12)
- residual moisture (water) content (Figure 13): Higher moisture content lead to stronger granules

#### Sommer

Sommer, drawn to the size enlargement of particles (p. 1, introduction), teaches that spray agglomeration (similar to what was taught by Moritz above) is the most commonly used method in the chemical industry with agglomerates in the 20 - 500 micron range and production rates of up to 50 tons per hour. (p. 2, col. 2, Table 1).

Sommer teaches that when fine particulate properties are required for processing or application, agglomerates must be easily broken down and when the agglomerate is to be dissolved during use, the required redispersibility depends on the wettability (p. 14, col. 2, para 3). Depending on the wetting angle of the powder, the apparent density will need to be greater than the density of the liquid dispersion medium (p. 15, col. 1, para 2). The optimal porosity and thus the optimal parent density is the one that gives the shortest overall reconstitution time (p. 15, col. 23, para 1).

Regarding claims 1 and 6, it would have been obvious to one of ordinary skill in powder granulation, at the time of the invention, to combine Schmidt in view of Moritz and Sommer to produce a granular metal powder that contains an organic compound, has an apparent density in the claimed range, and has a water content in the claimed range as Schmidt taught forming granular metal powder which contains a residual organic compound as a surface modifier (col. 5, lines 30-43), Moritz taught water (moisture) content as a result effective variable in the strength of granules, and lastly Sommer taught that the apparent density is a result effective variable in the redispersability of metal agglomerates and should be above the density of the dispersion medium, which in the case of Schmidt and Moritz was water (density  $\sim 1 \text{ g/cm}^3$ ), which suggests an apparent density of more than  $1 \text{ g/cm}^3$ . Motivation to choose the instantly claimed apparent density and water content ranges comes from process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP

2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

In particular, with respect to claim 1, From MPEP 2113: "The Patent Office bears a lesser burden of proof in making out a case of *prima facie* obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. *In re Fessmann*, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding claims 9 and 10, Schmidt disclosed several classes of organic compounds for use as surface modifiers which have carbon contents in claimed range, for example, guanidine carbonate, with a carbon content of about 19 wt% (col. 6, lines 29-30).

Regarding claims 11 and 12, Schmidt teaches that his invention is applicably to metals such as B, Al, Si, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, La, Y, Fe, Co, or Ni (col. 5, lines 1-6).

4. **Claims 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Schmidt** in view of **Moritz** and **Sommer** as applied to claims 1, 6, and 12 above, in further view of **Bouaricha** (US 2004/0208775 A1).

The disclosures of Schmidt, Moritz, and Sommer were discussed above, however none of the references disclosed the particle size of the metal granulates.

Bouaricha

Bouaricha, drawn to the agglomeration of nanoparticles into micrometric particles (para 0001), teaches that one of primary limitations of nanoparticles in general is that they cannot be processed directly in many applications due to extremely low density and flowability (para 0004). Thus there is a vital need for densifying and consolidating by agglomeration of particles into micron-size particles for processing (para 0004). A suitable size for agglomerates to enable easier handling is in the range of 1  $\mu\text{m}$  – 100  $\mu\text{m}$  (para 0015).

Regarding claims 7 and 8, it would have been obvious to one of ordinary skill in powder granulation, at the time of the invention, to form a granulate in the size range of 1 - 100 microns as Sommer taught that this size range is suitable for easier handling compared to the primary nanoparticles or nanopowders.

***Response to Applicant's Arguments:***

5. Applicant's arguments filed August 28<sup>th</sup>, 2008 have been fully considered but they are not persuasive.



Applicants assert (p. 3, para 3) that Schmidt teaches a different drying process than the claimed subject matter, thus the apparent density of the granular metal powder will be different.

In response, with respect to claim 1, From MPEP 2113: "The Patent Office bears a lesser burden of proof in making out a case of *prima facie* obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. *In re Fessmann*, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Applicants have not shown persuasive evidence that the claimed process imparts some particular structure to the granular metal powder *product* beyond the 1-100 nm particles, the presence of an organic compound, the apparent density, and the residual water content. Neither have Applicants shown persuasive evidence that the process of Schmidt would somehow not be able to produce the claimed product with structure as construed by the Examiner.

Applicants assertions with respect to Yokoyama (p. 4, para 3 – p. 5, para 3) are moot in view of the withdrawn of Yokoyama as a reference and the new grounds of rejection in this instant Office Action.

***Additional References of Interest***

**Cheng** – US 2007/0068341 A1

**Watano** – US 2007/0262481 A1

***Conclusion***

**-- Claims 1 and 6-12 are rejected**

**-- No claims are allowed**

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

***/Mark L. Shevin/***  
Examiner, Art Unit 1793

***/Roy King/***  
Supervisory Patent Examiner, Art Unit 1793

December 4th, 2008  
10-575,898